Chapter 22
Energy

This chapter describes the environmental setting and study area for energy; analyzes impacts that could result from construction, operation, and maintenance of the Delta Conveyance Project (project); and provides mitigation measures to reduce the effects of potentially significant impacts. This chapter also analyzes the impacts that could result from implementation of compensatory mitigation required for the project and describes any additional mitigation necessary to reduce those impacts, and analyzes the impacts that could result from other mitigation measures associated with other resource chapters in this Draft Environmental Impact Report (Draft EIR).

22.0 Summary Comparison of Alternatives

Table 22-0 provides a summary comparison of important impacts on energy by alternative. The table presents the CEQA findings after all mitigation is applied. If applicable, the table also presents quantitative results after all mitigation is applied. Important impacts to consider include the energy needed to construct the alternatives and the energy required for operation.

All of the project alternatives would require the use of electricity during both construction and operation, and would initially consume gasoline and diesel fuels through operation of heavy-duty construction equipment and vehicles. The maximum consumption of electricity during construction is expected to occur during tunnel boring for all project alternatives. During construction, it is expected that Alternative 4a would require the most electricity (about 2,717 gigawatt hours [GWh]), and Alternative 4b would require the least electricity (1,103 GWh). Fuel consumption for on-road and off-road construction equipment is expected to be highest for Alternative 4a (about 50 million gallons of gasoline and diesel), and Alternative 2b would require the least amount of fuel (32 million gallons of gasoline and diesel).

Table ES-2 in the Executive Summary summarizes all impacts disclosed in this chapter.

1 **Table 22-0. Comparison of Impacts on Energy by Alternative**

Chapter 22 – Energy	Alternative								
	1	2a	2b	2c	3	4a	4b	4c	5
Impact ENG-1: Result in Substantial Significant Environmental Impacts Due to Wasteful, Inefficient, or Unnecessary Consumption of Energy Resources during Project Construction or Operation.	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
Impact ENG-2: Conflict with or Obstruct Any State/Local Plan, Goal, Objective, or Policy for Renewable Energy or Energy Efficiency	NI	NI	NI	NI	NI	NI	NI	NI	NI

2 LTS = less than significant; NI = no impact.

22.1 Environmental Setting

Energy would be consumed during the construction, operation, and maintenance of projects, both directly and indirectly. This section describes the existing energy resources available within the study area and analyzes the potential effects to these energy resources from construction and operation of the project alternatives. New water conveyance facilities associated with the project alternatives would be constructed, owned, and operated as components of the State Water Project (SWP), and two project alternatives would involve connection to the Central Valley Project (CVP). Overall energy requirements are directly linked to SWP and CVP water supply deliveries to the various SWP and CVP contractors through their corresponding water conveyance system, including those facilities in the Delta. Accordingly, this section discusses energy generation at SWP and CVP hydropower facilities throughout the state and the energy use for conveyance.

Hydropower energy generation is a major project purpose for the SWP and CVP. Hydropower energy has always been an important part of the benefits and financing of state, federal, and private water resources developments in California. Runoff from the Sierra Nevada and Cascade Mountains provided great potential for hydropower development, which has now been harnessed to pump water supplies into the SWP and CVP canals, the San Luis Reservoir, and water distribution systems.

Some basic energy units are used in this evaluation. The basic units of electrical power (capacity) are kilowatt (kW), megawatt (MW), and gigawatt (GW). A megawatt is 1,000 kW, and a gigawatt is 1,000,000 kW or 1,000 MW. It is common for energy to be reported as the power supplied or consumed over a unit of time. For instance, generating electricity at the rate of 1 kW for 1 hour is a kilowatt hour (kWh). A 100 MW (100,000 kW) generating facility would produce 2,400,000 kWh (2,400 megawatt hours [MWh] or 2.4 gigawatt hours [GWh]) in a day.

22.1.1 Study Area

The study area for energy impact analysis includes project construction areas where energy is consumed and regional energy sources throughout the State of California that could be affected by the project alternatives' energy demand. High-voltage transmission lines in the project construction area are shown in Figure 21-6 in Chapter 21, *Public Services and Utilities*.

California's electrical infrastructure is a complex grid of energy generation connected by high-voltage electric transmission lines and lower-voltage distribution lines. Table 22-1 shows the breakdown of sources for electric power generation in the state in 2020. California produces about two-thirds of its electricity from sources within the state, and the remaining one-third is imported electricity from the Pacific Northwest and the American Southwest. In 2020, the total electricity imported was 81,663 GWh, down from 90,647 GWh in 2018 and up slightly from 77,229 in 2019 (California Energy Commission 2021a, 2021b, 2021c). From 2018 to 2020, total in-state solar generation increased 7% (2,191 GWh), while wind energy and large hydroelectric energy decreased by approximately 3% (370 GWh) and 23% (4,158 GWh), respectively. It should be noted that hydropower generation fluctuates based on hydrologic conditions; thus energy output differs from installed capacities. Nuclear generation also decreased by 12% (1,988 GWh) between 2018 and 2020; nuclear energy combined with large hydroelectric and renewable energy accounted for about 55% of California's in-state electric generation in 2020 (California Energy Commission 2021c).

Table 22-1. Total System Electric Generation in Gigawatt Hours for 2020

Fuel Type	California In-State Generation (GWh)	Percent of California In-State Generation	Northwest Imports (GWh)	Southwest Imports (GWh)	Total Imports (GWh)	Percent of Imports	California Energy Mix (GWh)	California Power Mix
Coal	317	0.17%	194	6,963	7,157	8.76%	7,474	2.74%
Natural Gas	92,298	48.35%	70	8,654	8,724	10.68%	101,022	37.06%
Oil	30	0.02%	–	–	0	0.00%	30	0.01%
Other (Waste Heat/ Petroleum Coke)	384	0.20%	125	9	134	0.16%	518	0.19%
Nuclear [a]	16,280	8.53%	672	8,481	9,154	11.21%	25,434	9.33%
Large Hydro	17,938	9.40%	14,078	1,259	15,337	18.78%	33,275	12.21%
Unspecified	–	0.00%	12,870	1,745	14,615	17.90%	14,615	5.36%
Total Non-Renewables and Unspecified	127,248	66.65%	28,009	27,111	55,120	67.50%	182,368	66.91%
Biomass	5,680	2.97%	975	25	1,000	1.22%	6,679	2.45%
Geothermal	11,345	5.94%	166	1,825	1,991	2.44%	13,336	4.89%
Small Hydro	3,476	1.82%	320	2	322	0.39%	3,798	1.39%
Solar	29,456	15.43%	284	6,312	6,596	8.08%	36,052	13.23%
Wind	13,708	7.18%	11,438	5,197	16,635	20.37%	30,343	11.13%
Total Renewables	63,665	33.35%	13,184	13,359	26,543	32.50%	90,208	33.09%
Total System Energy	190,913	100.00%	41,193	40,471	81,663	100.00%	272,576	100.00%

Source: California Energy Commission 2021a.
GWh = gigawatt hours.
[a] Diablo Canyon nuclear power plant is expected to be decommissioned in 2025.

A total of 274 hydroelectric facilities in California, consisting of both small—under 30 MW facilities (e.g., Southern California Edison [SCE] and Pacific Gas and Electric Company [PG&E])—and large—30 MW or higher facilities (e.g., SWP and CVP)—provide a total capacity of 14,042 MW (California Energy Commission 2021d). Hydroelectric output is highly variable year to year and supplies between 14% and 28% of electricity used in California, depending on the water year type (California Energy Commission 2020). In 1992, at the end of the 1987–1992 drought, hydropower provided less than 11% of the electricity used in California. However, during a wetter year (1995), hydropower provided approximately 28% of electricity used in California. The annual average hydroelectric generation from 1983 through 2020 is 34,132.5 GWh (California Energy Commission 2021d).

In recent years, California's supply reliability has been stressed due to climate-induced natural disasters such as wildfires and severe drought. The July 2021 Bootleg fire in southern Oregon threatened the California-Oregon lntertie, which delivers power from the Pacific Northwest into California. Additionally, severe droughts have caused reservoir levels to drop, causing reductions to or complete cessations of California's hydropower generation. As a result of these conditions and the expectation that they will continue, Governor Newsom declared a state of emergency in July 2021, stating that the *"…California Energy Commission is directed, and the California Public Utilities Commission and the CAISO are requested, to work with the State's load serving entities on accelerating plans for the construction, procurement, and rapid deployment of new clean energy and storage* *projects to mitigate the risk of capacity shortages and increase the availability of carbon-free energy at all times of day…."* The declaration also incentivized large energy users to reduce electricity demand and declared other temporary generation and operational parameters to reduce demand or provide supplies to California's energy grid.

22.1.1.1 SWP Power and Energy Resources

The SWP generates hydroelectricity at the Oroville facilities and along the California Aqueduct at energy recovery plants (California Department of Water Resources 2021a:210) (see Figure 22-1). Hydroelectric generation typically provides the largest share of SWP power resources. The SWP power generation facilities are operated primarily to offset energy requirements to operate SWP facilities, and associated revenues are to offset the operations and maintenance costs of the SWP. In general, the cost to operate the SWP exceeds the ability to offset such costs with revenue from SWP generation. Table 22-2 summarizes SWP power facilities and capacities.

California Department of Water Resources (DWR) has contracts with the California Independent System Operator (CAISO), PG&E, and SCE for transmission interconnection and transmission service for SWP power resources and pumping loads. (California Department of Water Resources 2021a:213). The SWP also markets excess regional energy and capacity in the CAISO markets to members of the Western Systems Power Pool.

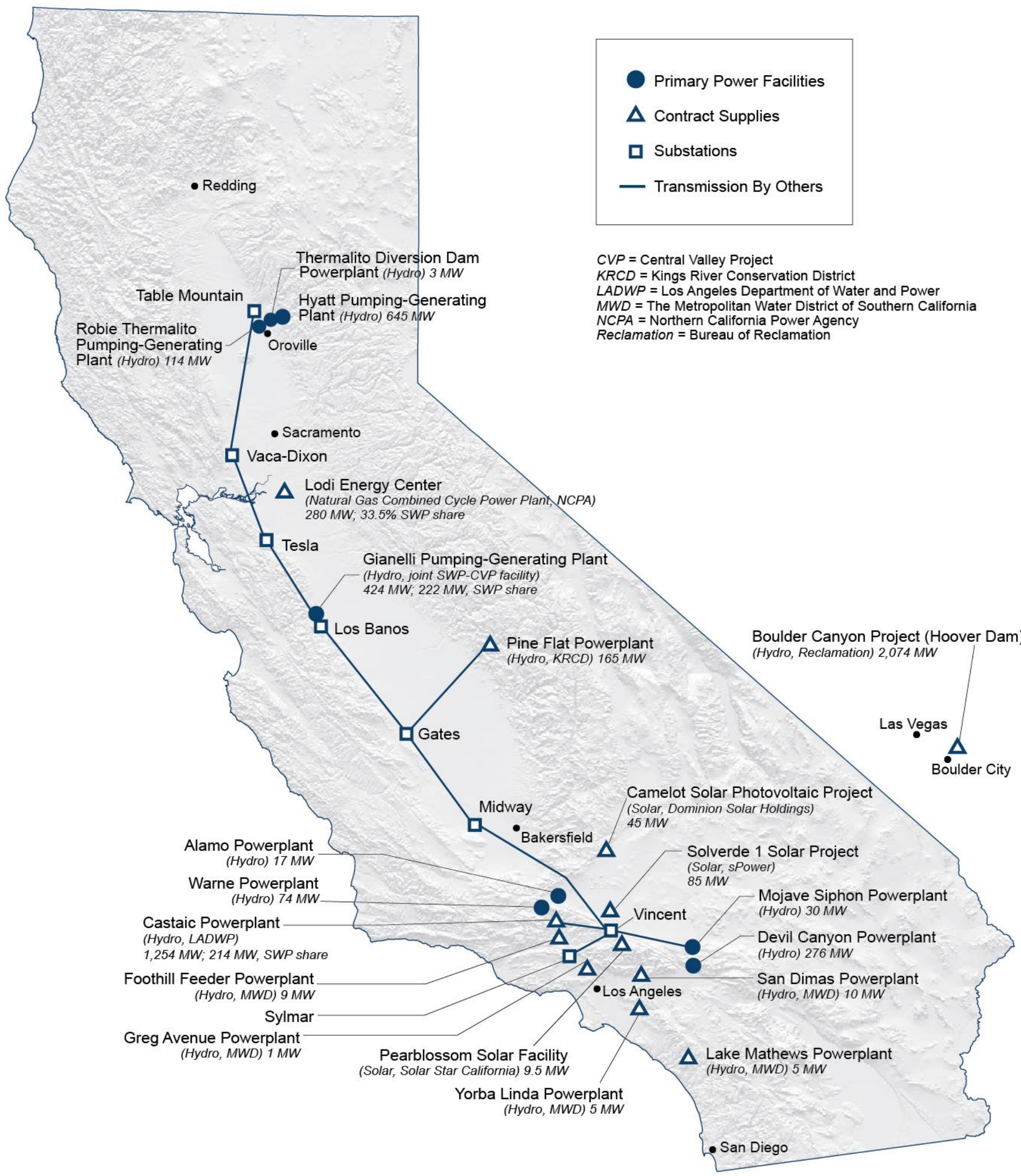
Table 22-2. Primary State Water Project Hydroelectric Powerplants

Facility	Installed Capacity (MW)
Hyatt Pumping-Generating Plant	645
Thermalito Diversion Dam Powerplant	3
Robie Thermalito	114
William R. Gianelli (total)	424
Warne Powerplant	74
Castaic [a]	1,254
Alamo Powerplant	17
Mojave Siphon Powerplant	30
Devil Canyon Powerplant	276

Source: California Department of Water Resources 2021a:10.
MW = megawatt.
[a] Castaic Pumping-Generating Plant is owned and operated by the Los Angeles Department of Water and Power.

SWP power generation facilities were originally developed to match SWP energy use loads; however, the CAISO energy market redesign in 2009 removed the need to balance SWP load with SWP generation. The SWP load is served by obtaining energy from CAISO market participants. The majority of the energy used by the SWP is required for pumping facilities located in the Delta, at the San Luis Reservoir, and along the California Aqueduct. Table 22-3 shows the pump load for each SWP pumping facility.

A text description of this figure is provided in Chapter 39, *Text Descriptions of Figures*



Source: California Department of Water Resources 2021a

Figure 22-1. Names, Locations, and Nameplate Capacities of Primary State Water Project Power Facilities

Table 22-3. State Water Project Pumping Plant Loads

Facility	Pumping Load (MW)
Hyatt Pumping-Generating Plant	387
Robie Thermalito	89
Barker Slough Pumping Plant	4
Cordelia Pumping Plant	4.2 [a]
South Bay Pumping Plant	21
Del Valle Pumping Plant	1
Harvey O. Banks Pumping Plant	248
William R. Gianelli Pumping Plant	376
Dos Amigos Pumping Plant	179
Buena Vista Pumping Plant	108
John R. Teerink Pumping Plant	112
Ira J. Chrisman Pumping Plant	246
A.D. Edmonston Pumping Plant	835
Oso Pumping Plant	70
Citrus Pump Station	13
Pearblossom Pumping Plant	152
Las Perillas Pumping Plant	3
Badger Hill Pumping Plant	9
Devil's Den Pumping Plant	8
Bluestone Pumping Plant	8
Polonio Pass Pumping Plant	8
Greenspot Pump Station	4
Crafton Hills Pump Station	10
Cherry Valley Pump Station	0.7

Source: California Department of Water Resources 2021a:9.
MW = megawatt.
[a] California Department of Water Resources 2006.

The monthly power generation pattern follows seasonal reservoir releases, with peaks during the irrigation season (generally May through October). In 2017, total energy required to operate the SWP was about 9.66 million MWh, of which about 47% in volume was offset by SWP-generated energy resources that are offered for sale on the CAISO market. The energy needs of operating SWP is through the CAISO centralized market and long-term agreements and purchases (California Department of Water Resources 2021a:217, 218).

Energy generation, purchases, and use can be influenced by many factors. For example, after 2007, there was an overall decrease due to the reduced ability to convey SWP water across the Delta in accordance with legal decisions and subsequent implementation of the 2008 National Marine Fisheries Service and 2009 U.S. Fish and Wildlife Service Biological Opinions (BiOps). The California Public Utilities Commission (CPUC) evaluated the energy intensity of several types of water supplies (California Public Utilities Commission 2010:62). Energy intensity is defined as the average amount of energy required to convey and/or treat water on a unit basis, such as per 1 acre-foot (AF). SWP pumping plants require substantial quantities of energy to convey large amounts of water over long distances with significant changes in elevation. Energy intensity values calculated by the CPUC for the SWP ranged from:

- 1.128 MWh/AF for water users along the South Bay Aqueduct, to
- 1.157 MWh/AF for water users in Kern County, to
- 4,644 kWh/AF for water users at the terminal end of the East Branch Extension of the California Aqueduct (California Public Utilities Commission 2010:62).

22.1.1.2 CVP Power and Energy Resources

Power generated by the CVP is transmitted by Western Area Power Administration (WAPA) to CVP facilities. CVP facilities generally use around 25%–30% of the power generated by the CVP (Western Area Power Administration 2004:9). Under existing laws, WAPA markets the remaining power to preference customers, which includes four first preference customers (i.e., Calaveras Public Power Agency, California Department of Corrections: Sierra Conservation Center, Trinity Public Utilities District, and Tuolumne Public Power Agency), Indian Tribes, federal agencies, military bases, municipalities, public utilities districts, irrigation and water districts, and state agencies.

CVP power facilities include 11 hydroelectric powerplants that have a total maximum generating capacity of 1,994.35 MW, as presented in Table 22-4. Hydrology can vary substantially from year to year, which then affects hydropower production. Typically, in an average water year, approximately 5.6 billion kilowatt hours of energy is produced (Bureau of Reclamation 2021a). Major factors that influence powerplant operations include required downstream water releases, electric system needs, and project use demand. The power generated from CVP powerplants is dedicated to first meeting the requirements of CVP facilities. The remaining energy is marketed by WAPA to preference customers in Northern California.

Table 22-4. Central Valley Project Hydroelectric Powerplants

Facility	Installed Capacity (MW)
Trinity Powerplant	140
Lewiston Powerplant	0.35
Judge Francis Carr Powerplant	154
Shasta Powerplant	663
Spring Creek Powerplant	180
Keswick Powerplant	117
Folsom Powerplant	199
Nimbus Powerplant	14
New Melones Powerplant	300
O'Neill Pump-Generating Plant	25
San Luis Powerplant (CVP portion of the William R. Gianelli/ San Luis Pump-Generating Plant)	202

Source: Bureau of Reclamation 2021b.
CVP = Central Valley Project; MW = megawatt.

Power generation at CVP hydropower facilities fluctuates in response to reservoir releases and conveyance flows. Reservoir releases are affected by hydrologic conditions, minimum stream flow requirements, flow fluctuation restrictions, water quality requirements, and water rights with priority, which must be met prior to releases for CVP water service contractors. The CVP power generation facilities were developed to meet CVP energy use loads. Most of the energy used by the CVP is needed for pumping plants in the Delta, at San Luis Reservoir, and along the Delta-Mendota Canal (DMC) and San Luis Canal portion of the California Aqueduct. Table 22-5 presents historical average annual CVP hydropower generation and use. Monthly power generation pattern follows seasonal reservoir releases, with peaks during the irrigation season. Hydropower generation between January and June decreased after 2007. This was due to Old and Middle River flow restrictions in accordance with legal decisions and through implementation of the 2008 and 2009 BiOps for the long-term operation of CVP and SWP.

Table 22-5. Hydropower Generation and Energy Use by Central Valley Project

Calendar Year	Water Year Type [a]	Net CVP Hydropower Generation (GWh) [b]	Energy Used CVP Facilities (GWh)
2000	AN	5,701	–
2001	D	4,169	957
2002	D	4,378	1,090
2003	AN	5,484	1,170
2004	BN	5,187	1,172
2005	AN	4,599	1,150
2006	W	7,285	1,037
2007	D	4,276	1,064
2008	C	3,673	923
2009	D	3,392	803
2010	BN	4,118	1,001
2011	W	5,629	1,276
2012	BN	4,423	990
2013	D	4,314	NA
2014	C	2,751	NA
2015	C	2,471	NA
2016	BN	3,605	NA
2017	W	6,253	NA
2018	D	3,939	NA

Source: Bureau of Reclamation 2021c.

CVP = Central Valley Project; GWh = gigawatt hour; NA = not available.

[a] Water year type based on Sacramento Valley 40-30-30 Index as described in Chapter 6, *Water Supply*. AN = above normal; BN = below normal; C= critical; D = dry; W = wet.

[b] After station service. Includes federal share of San Luis.

The CPUC study indicated that the energy intensity of CVP water delivered to users downstream of San Luis Reservoir was as follows.

- 0.292 MWh/AF for users along the DMC.
- 0.428 MWh/AF for users along the San Luis Canal/California Aqueduct.
- 0.870 MWh/AF in San Benito and Santa Clara Counties.

22.1.2 Trinity River

The Trinity Powerplant is on the Trinity River. Primary releases of Trinity Dam water are made through the powerplant. Trinity County has first preference to the power from this plant.

The Lewiston Powerplant is at the Lewiston Dam along the Trinity River. It is operated in conjunction with the spillway gates to maintain minimum flow in the Trinity River downstream. Since the Lewiston Powerplant's turbine capacity is less than the Trinity River minimum flow criteria, the turbines are usually set at maximum output with the spillway gates adjusted to regulate river flow. The Lewiston Powerplant provides power to the adjacent fish hatchery.

22.1.3 Sacramento River and Clear Creek

The Shasta Powerplant is a peaking powerplant[1] located downstream of Shasta Dam along the Sacramento River. The Shasta Powerplant also provides water for the Livingston Stone National Fish Hatchery.

The Judge Francis Carr Powerplant is a peaking powerplant located on the Clear Creek Tunnel and discharges into the Whiskeytown Reservoir. Power is first dedicated to meeting the energy requirements of CVP facilities, with any remaining energy being marketed to various customers in northern California. It generates power from water exported from the Trinity River Basin. Trinity County has first preference to the power benefit from this facility.

The Spring Creek Powerplant is a peaking powerplant along Spring Creek at the foot of Spring Creek Debris Dam. Water discharged into the Whiskeytown Reservoir via the Judge Francis Carr Powerplant provides the source of water for Spring Creek Powerplant generation. Water from Whiskeytown Reservoir is diverted from the lake via the Spring Creek Tunnel to the powerplant. Trinity County has first preference to the power benefits from Spring Creek Powerplant. Water from Spring Creek Powerplant is discharged into Keswick Reservoir. Releases from Spring Creek Powerplant also are operated to maintain water quality in the Spring Creek arm of Keswick Reservoir.

The Keswick Powerplant is located at Keswick Dam along the Sacramento River downstream of Shasta Dam and regulates flows into the Sacramento River from both Shasta Lake and Spring Creek releases. It is considered a run-of-the-river powerplant.[2]

[1] Peaking powerplants meet the fluctuating needs of users, and generally run only when there is a high demand, known as peak demand, for electricity. Common peaking periods include hot summer days or cold winter days and most often occur in the afternoons and evenings.

[2] Run-of-the-river powerplants are a type of hydroelectric generation plant whereby little or no water storage is provided. They use a stream's or river's sustained minimum flows or are regulated by a lake or upstream reservoir.

22.1.4 Feather River

The Hyatt Pumping-Generating Plant is on the channel between Lake Oroville and the Thermalito Diversion Pool. Water in the Thermalito Diversion Pool can be pumped back to Lake Oroville to be released through the Hyatt Pumping-Generating Plant and generate more electricity; released through the Thermalito Diversion Dam Powerplant for delivery to the low flow channel upstream of Thermalito Forebay; or conveyed to Thermalito Forebay for subsequent release through the Thermalito Pumping-Generating Plant. The combined Hyatt Pumping-Generating Plant and Thermalito Pumping-Generating Plant generate approximately 2,200 GWh of energy in a median water year, while the 3 MW generated by Thermalito Diversion Dam Powerplant adds another 24 GWh per year (California Department of Water Resources 2021a:210).

22.1.5 American River

The Folsom Powerplant is a federal peaking powerplant at Folsom Dam along the American River. The Folsom Powerplant is operated in an integrated manner with flood control and storage management operations at Folsom Reservoir. One of the integrated operations is related to coordinating early flood control releases with power generation. It also provides power for the pumping plant that supplies the local domestic water supply. Folsom Powerplant supports voltage support for the Sacramento region during summer heavy load times.

The Nimbus Powerplant is located at Nimbus Dam along the American River, downstream of Folsom Dam. The Nimbus Powerplant regulates releases from Folsom Dam into the American River and is considered a run-of-the-river powerplant.

22.1.6 Stanislaus River

The New Melones Powerplant is a peaking powerplant located along the Stanislaus River. Primary reservoir releases are made through the powerplant.

22.1.7 San Joaquin River

The project would have no impacts on the San Joaquin River Basin. Therefore, this analysis does not include powerplants along the San Joaquin River; their operations would be expected to be consistent among all alternatives.

22.1.8 Central Valley Project and State Water Project Service Areas (South to Diamond Valley)

22.1.8.1 San Luis Reservoir Powerplants

The O’Neill Pump-Generating Plant is on a channel that conveys water between the DMC and the O’Neill Forebay. This pump-generating plant only generates power when water is released from the O’Neill Reservoir to the DMC. When water is conveyed from the DMC to O’Neill Forebay, the units serve as pumps, not hydroelectric generators. The generated power is used to support CVP pumping and irrigation actions of the CVP.

The William R. Gianelli (San Luis) Pump-Generating Plant is located along the western boundary of the O'Neill Forebay at the San Luis Dam. This pump-generating plant is a joint federal-state facility operated and maintained by the state and shared by the SWP and CVP. Energy is generated when water is conveyed from San Luis Reservoir back into O'Neill Forebay for continued conveyance to the DMC. The plant is operated in pumping mode when water is moved from O'Neill Forebay to San Luis Reservoir for storage until heavier water demands develop. The generated power is used to offset SWP and CVP pumping loads. The powerplant can generate up to 424 MW, with the CVP share of the total capacity being 202 MW.

22.1.8.2 East Branch and West Branch Powerplants

Downstream of the Antelope Valley, the California Aqueduct divides into the East Branch and West Branch. The Alamo Powerplant, Mojave Powerplant, and Devil Canyon Powerplant are located along the East Branch, which conveys water into San Bernardino County (California Department of Water Resources 2021a:5). The Warne Powerplant is located along the West Branch, which conveys water into Los Angeles County. The generation rates vary at these powerplants depending upon the amount of water conveyed.

22.1.8.3 Other Energy Resources for the State Water Project

Other energy supplies have been obtained by DWR from utilities and energy marketers under agreements that allow DWR to buy, sell, or exchange energy on a short-term hourly basis or a long-term multiyear basis (California Department of Water Resources 2021a:212–216). For example, DWR jointly developed the 1,254-MW Castaic Powerplant on the West Branch with the Los Angeles Department of Water and Power (California Department of Water Resources 2021a:209). DWR also has a long-term power purchase agreement with the Kings River Conservation District for approximately 400 million kWh of energy from the 165-MW hydroelectric Pine Flat Powerplant (California Department of Water Resources 2021a:210).

Pursuant to DWR's *Climate Action Plan Phase 1: Greenhouse Gas Emissions Reduction Plan*, DWR has contracted for zero-emission and renewable energy generation to help meet the SWP's greenhouse gas (GHG) Renewable Energy Procurement Plan (REPP) (California Department of Water Resources 2020:44). The REPP was updated in 2020 to meet California's clean energy goals established by *The 100 Percent Clean Energy Act of 2018*, as enacted by Senate Bill (SB) 100. SB 100 sets a 2045 goal of powering all retail electricity sold in California and state agency electricity needs with renewable and zero-carbon resources—those such as solar and wind energy that do not emit climate-altering GHGs; updating the state's Renewables Portfolio Standard to ensure that by 2030 at least 60% of California's electricity is renewable; and requiring the California Energy Commission (CEC), CPUC, and California Air Resources Board to use programs under existing laws to achieve 100% clean electricity and issue a joint policy report on SB 100 by 2021 and every four years thereafter. Under the REPP, SWP's power portfolio is targeted to be 75% zero-emissions by 2030 and 100% zero-emissions by 2045. Through a variety of solar and small hydro projects, active contracts total 353 MWh of capacity and 1,025 GWh of energy (California Department of Water Resources 2021c). One such contract is with four hydroelectric plants with approximately 30 MW of installed capacity that are owned and operated by Metropolitan Water District of Southern California (California Department of Water Resources 2021a:212).

22.1.9 Other Hydroelectric Generation Facilities

Hydroelectric facilities in addition to SWP and CVP hydroelectric facilities in the study area are owned by investor-owned utility companies, such as PG&E and Southern California Edison; municipal agencies, such as Sacramento Municipal Utility District (SMUD); and local and regional water agencies. Some of the larger facilities outside the SWP and CVP systems and within or adjacent to the study area include those listed below (Yuba County Water Agency 2021).

- PG&E
  - Helms Pumped Storage (1,200 MW) in Fresno County
  - Pit System (320 MW) and McCloud-Pit System (370 MW, total) in Shasta County
  - Upper North Fork Feather River System (360 MW) in Plumas County
- SMUD Upper American River Project System (688 MW) in El Dorado County
- City and County of San Francisco Hetch Hetchy Power System (390 MW) in Tuolumne County
- Southern California Edison
  - Big Creek System and Eastwood Pump Storage (approximately 1,000 MW) in Fresno and Madera Counties
  - Mammoth Pool Project (187 MW) in Fresno and Madera Counties
- Turlock Irrigation District and Modesto Irrigation District New Don Pedro Project (203 MW) in Tuolumne County
- Yuba Water Agency Yuba River Development Project (362 MW) in Yuba County

22.1.10 Energy Demands for Groundwater Pumping

Groundwater provides approximately 40% of the state's agricultural, municipal, and industrial water supply for average water needs (California Department of Water Resources 2016:1). Groundwater use varies regionally throughout the state.

The amount of energy used statewide to pump groundwater is not well quantified (California Public Utilities Commission 2010:5). The CPUC estimated groundwater energy use by hydrologic region and by type of use to evaluate the water and energy relationships. Groundwater pumping estimates were calculated for agricultural and municipal water demands. Groundwater energy use was estimated based upon assumptions of well depths and pump efficiencies. Some wells use natural gas for individual engines instead of electricity; however, the amount of natural gas pumping versus electric pumping is generally unknown. In 2015 (i.e., a critically dry year), groundwater use in California equated to 22.9 million AF, or 58% of statewide water use. The 15-year average for groundwater use (i.e., between 2002 and 2016) equated to 17.6 million AF, or 41% of statewide water use (California Department of Water Resources 2021b:H-1). The CPUC estimated that in 2010, statewide groundwater pumping accounted for more electricity use between May and August than total electricity use by SWP and CVP during that time period (California Public Utilities Commission 2010:5). Over the entire year of 2010, it was estimated that groundwater pumping used approximately 10% more electricity than the SWP and approximately 5% less than the SWP and CVP combined.

22.2 Applicable Laws, Regulations, and Programs

The applicable laws, regulations, and programs considered in the assessment of project impacts on energy are indicated in Section 22.3.1, *Methods for Analysis*, or the impact analysis, as appropriate. Applicable laws, regulations and programs associated with state and federal agencies that have a review or potential approval responsibility have also been considered in the development of CEQA impact thresholds or are otherwise considered in the assessment of environmental impacts. A listing of some of the agencies and their respective potential review and approval responsibilities, in addition to those under CEQA, is provided in Chapter 1, *Introduction*, Table 1-1. A listing of some of the federal agencies and their respective potential review, approval, and other responsibilities, in addition to those under NEPA, is provided in Chapter 1, Table 1-2.

22.3 Environmental Impacts

This section describes the direct and cumulative environmental impacts associated with energy that would result from project construction, operation, and maintenance of the project. It describes the methods used to determine the impacts of the project and lists the thresholds used to conclude whether an impact would be significant. Measures to mitigate (i.e., avoid, minimize, rectify, reduce, eliminate, or compensate for) significant impacts are provided. Indirect impacts are discussed in Chapter 31, *Growth Inducement*.

22.3.1 Methods for Analysis

This section discusses the methods to analyze (1) the energy (i.e., electrical use and fuel consumption) required for the construction of the water conveyance facilities and (2) the energy consumed (i.e., via pumping) or produced (i.e., via hydroelectric generation) during operation of the project.

22.3.1.1 Process and Methods of Review for Energy

Effects on energy resources were assessed by identifying energy consumption/generation to evaluate whether energy resources would be affected by construction or operation of the project. Specifically, the following potential impacts were assessed by evaluating an alternative's potential to:

- Result in wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation or
- Conflict with or obstruct a state or local plan for renewable energy or energy efficiency.

Effects on energy production and use have been evaluated for the existing SWP and CVP facilities, as well as proposed conveyance and pumping facilities. Existing transmission lines, switching stations, and substations have been designed and constructed to accommodate normal seasonal patterns of energy generation at SWP and CVP hydropower facilities and to accommodate electrical energy uses at water supply pumping plants.

Consistent with Appendix F of the CEQA Guidelines, assessment comparisons are presented for the qualitative or quantitative analyses of changes in energy conditions. Environmental impact assessments, as included in Appendix F, have been addressed as follows.

1. *The project's energy requirements and its energy use efficiencies by amount and fuel type for each stage of the project including construction, operation, maintenance and/or removal. If appropriate, the energy intensiveness of materials may be discussed.*

   This chapter includes a comparison of each alternative to existing conditions to indicate the general extent of changes in net energy requirements for each stage of the project. This comparison is based on the change from existing conditions (i.e., historical data) compared to CalSim 3 modeling results, LTGen post-processing results, and SWP power model analysis results (Section 22.3.1.3, *Evaluation of Operations;* Tables 22-7 through 22-14).

   Impact discussion ENG-1 provides descriptions of both construction and operational energy efficiencies that have been incorporated into the project.

2. *The effects of the project on local and regional energy supplies and on requirements for additional capacity.*

   This chapter contains a qualitative discussion regarding the potential for new energy resources (Section 22.3.3, *Potential for New Energy Resources*) and includes quantitative analyses regarding the differing energy types and estimated energy usage per alternative. Chapter 21, *Public Services and Utilities,* provides a discussion regarding the need for additional capacity to accommodate construction in Impact discussion UT-2.

   Chapter 23, *Air Quality and Greenhouse Gas*, discusses the Delta Conveyance Project's use of DWR's REPP, DWR's plan for incrementally reducing SWP GHG emissions by increasing the use of renewable energy and reducing the use of energy from thermal and unspecified sources to operate the SWP. Electricity resources purchased under the REPP will meet State policy on renewable energy resources as generally defined by law and the CEC's Renewable Resource Eligibility Guidebook.

   The SWP's power portfolio currently consists of 65% renewable energy from its own carbon-free hydroelectric generation and from renewable energy purchases like solar power. DWR is on track to be at 75% by 2030 and 100% by 2045 or earlier for its GHG emission reduction goals.

   Table 23-71 in Chapter 23 shows how the REPP could be modified to accommodate all project alternatives and shows how additional renewable energy resources over what was programmed in the original REPP could be purchased between 2035 and 2045. The net result of this change is that by 2045, DWR's energy portfolio would contain nearly 600 GWh of additional renewable energy (in addition to hydropower generated at SWP facilities).

3. *The effects of the project on peak and base period demands for electricity and other forms of energy.*

   Energy operations were analyzed for each alternative using the CalSim 3 model (Appendix 5A, *Modeling Technical Appendix*) and the LTGen and SWP post-processing power models in sequence. LTGen uses the appropriate operations at each CVP reservoir, pumping plant, and powerhouse from the CalSim 3 model to calculate energy use and generation at these facilities (Section 22.3.1.3). The SWP power model performs similar computations for SWP facilities. CalSim 3 presents results based on volumes of water on a monthly basis, not weekly or daily; thus the assessment methodology is not finite enough to ascertain peak and base period demands on a weekly or daily basis.

DWR currently schedules the SWP's need to serve load and to supply generation based on the CAISO's market timelines through an extensive computerized network. Such schedules attempt to minimize the market costs of operating the SWP while aligning with the State's goals to support renewable energy, such as using operating flexibility (storage reservoirs) to enable solar to be dispatched by CAISO during solar peak hours as opposed to releasing SWP water and generating during that time, which could compete with solar.

4. *The degree to which the project complies with existing energy standards.*

Impact ENG-2: *Conflict with or Obstruct Any State/Local Plan, Goal, Objective, or Policy for Renewable Energy or Energy Efficiency* provides a discussion on applicable plans for renewable energy and energy efficiency to determine the degree to which the project complies with existing energy standards.

5. *The effects of the project on energy resources.*

The discussions of Impact ENG-1: *Result in Substantial Significant Environmental Impacts Due to Wasteful, Inefficient, or Unnecessary Consumption of Energy Resources during Project Construction or Operation* in this chapter and Impact UT-2: *Require or Result in the Relocation or Construction of New or Expanded Service System Infrastructure, the Construction or Relocation of Which Could Cause Significant Environmental Impacts for Any Service Systems Such as Water, Wastewater Treatment, Stormwater Drainage, Electric Power Facilities, Natural Gas Facilities, and Telecommunications Facilities* in Chapter 21, *Public Services and Utilities*, provide quantitative and qualitative assessments regarding how all project alternatives would affect energy resources (see also Tables 22-7 through 22-14).

6. *The project's projected transportation energy use requirements and its overall use of efficient transportation alternatives.*

Although this project is not a transportation project, it would result in multiyear construction resulting in fuel consumption (gasoline and diesel) associated with transportation of materials and workers. Expected energy use by construction vehicles is provided in Table 22-7. Additionally, Impact TRANS-1: *Increased Average VMT Per Construction Employee versus Regional Average* in Chapter 20, *Transportation*, describes temporary increases in vehicle miles traveled (VMT), which indirectly results in the consumption of fuel. Mitigation Measure TRANS-1: *Implement Site-Specific Construction Transportation Demand Management Plan and Transportation Management Plan* requires the implementation of a site-specific construction transportation demand management plan and transportation management plan. This measure would help to minimize VMT, thus reducing the amount of fuel that would be required to operate construction-related vehicles.

Transportation energy use associated with project operations, as summarized in Impact TRANS-1, would not exceed regional average for daily VMT, and is therefore not expected to result in a substantial increase in fuel consumption.

22.3.1.2 Evaluation of Construction Activities

Electrical energy needs for construction were evaluated based on the estimated annual energy required for each alternative. The construction energy requirements were estimated from the facilities that would require electrical energy during construction for each alternative. The construction-related energy demand is considered temporary (i.e., would cease once construction is complete). Construction of the project water conveyance facility would require use of electricity for lighting, tunnel ventilation, tunnel boring, earth removal from the tunnels, and other construction machinery.

Project construction would also consume gasoline and diesel fuels through operation of heavy-duty construction equipment and vehicles. Accordingly, this analysis focuses on energy associated with physical construction of the water conveyance facilities (i.e., fuels consumed by heavy-duty equipment and vehicles).

Gasoline and diesel fuel consumption by on-site equipment vehicles was calculated by converting GHG emissions that were calculated during the air quality analysis (Chapter 23) using the rate of carbon dioxide (CO_2) emitted per gallon of combusted diesel fuel (10.21 kilograms/gallon) (Climate Registry 2020:Table 1.1). Gasoline and diesel fuel consumption by off-site vehicles (e.g., employee commute vehicles) was calculated using the California Air Resources Board's EMFAC2017 model and available traffic data (i.e., annual miles traveled) (Chapter 20).

As explained in the air quality analysis, DWR has included Environmental Commitment EC-13: *DWR Best Management Practices to Reduce GHG Emissions*, which includes a commitment to using alternatives fuels such as solar power to power generators to the maximum extent feasible. Additionally, as part of Mitigation Measure AQ-9: *Develop and Implement a GHG Reduction Plan to Reduce GHG Emissions from Construction and Net CVP Operational Pumping to Net Zero*, DWR will develop and implement a GHG reduction plan to reduce GHG emissions from both construction and net CVP operational pumping. The plan contents will include on-site construction strategies such as purchasing zero-carbon electricity, using electric vehicles and optimizing delivery logistics, and off-site Strategies such as supporting community renewable energy projects, and increasing renewable energy purchases for operations. These commitments would not only reduce construction-related air emissions, they would also constitute a renewable energy feature of the project.

Additional considerations were made during project development to reduce the direct and indirect use of non-renewable fossil fuels and use of renewable fuels as listed below in Table 22-6. Some items were carried forward and incorporated into the project as presented in EC-17, *Pursue Solar Electric Power Options at Conveyance Facility Sites*, some are still under consideration, and some options were dismissed. A list of these items and explanations of whether or not they are still under consideration are included in the summary.

Table 22-6. Additional Renewable Energy Options Considered for Project Construction or Operation

Option	Option Consideration or Dismissal
During construction, adding solar panels for on-site electrical generation.	Construction boundaries were modified to minimize disturbance to adjacent land uses. Therefore, there would not be any available land within the construction boundaries to accommodate solar panels, and this was not considered further.
Following construction at the intake sites, placement of solar panels over the sedimentation basin or sedimentation drying lagoons.	Sediment removal within these facilities would require periodic placement of large equipment in these structures which would require the removal of the solar panels to accommodate equipment; therefore, this was not considered further.
Following construction, use solar powered lighting that is controlled by photocells	Use of nighttime lighting may have potential impacts on terrestrial resources (lighting that can spill over into adjacent habitats) and aesthetics (light and glare on

Option	Option Consideration or Dismissal
and motion sensors (motion-activated) at certain facilities.	adjacent properties). Therefore, in some cases such lighting may not be appropriate.
Following construction, add solar panels at the tunnel reception and maintenance shaft sites in available areas.	Solar generation at this site would be pursued and developed if found to be feasible.
Following construction, do not restore land at the tunnel launch shaft sites and instead use these lands for solar panels.	Solar generation at this site would be pursued and developed if found to be feasible.
Following construction, do not restore land at the Southern Complex and Bethany Complex and instead use these lands for solar panels.	Following construction at the intake sites, tunnel launch shaft sites, Southern Complex, and Bethany Complex, the portion of the construction sites not required for operations could be restored to agricultural or habitat land uses. Therefore, these lands would not be available to accommodate long-term solar panels; therefore, this was not considered further.
Following construction, add solar panels to the flat-roofed buildings at the Southern Complex or Bethany Complex pumping plants (not including buildings with access hatches).	Solar generation at these sites would be pursued and developed if found to be feasible.

22.3.1.3 Evaluation of Operations

SWP and CVP system energy operations were analyzed for each alternative using the CalSim 3 model and the LTGen and SWP post-processing power models in sequence. LTGen uses the appropriate operations at each CVP reservoir, pumping plant, and powerhouse from the CalSim 3 model to calculate energy use and generation at these facilities. The SWP power model performs similar computations for SWP facilities. Details about the model and processing tool computational methods are in Appendix 5A.

Project alternative operation is included in CalSim 3 simulations for the Southern Complex facilities or Bethany Complex facilities, but these facilities are not included in the LTGen or the SWP post-processing power models. The pumping energy required for the Southern Complex facilities or Bethany Complex facilities, depending on the alternative, was calculated separately using the CalSim 3 operations and the appropriate average pumping power consumption rates for each project alternative in a separate tool. Alternative 5 is unique in that the water through the new facility bypasses the Banks Pumping Plant, with any remaining export using the Banks Pumping Plant. The energy required for the reduced flow through the Banks Pumping Plant is calculated in the SWP post-processing power model, and the energy for the flow through the new facility is calculated in this separate power computation tool. The calculated project alternative pumping energy required by the new facilities was then added to LTGen and SWP power analysis results to get total system pumping energy and generation amounts.

Project maintenance would also consume gasoline and diesel fuels through operation of maintenance equipment and vehicles. Accordingly, this analysis focuses on energy associated with maintenance of the water conveyance facilities (i.e., fuels consumed by equipment and vehicles).

Gasoline and diesel fuel consumption by equipment and vehicles was calculated by converting GHG emissions that were calculated during the air quality analysis (Chapter 23) using the rate of carbon dioxide (CO_2) emitted per gallon of combusted diesel fuel (10.21 kilograms/gallon) and gasoline fuel (8.78 kilograms/gallon) (Climate Registry 2020:Table 1.1).

22.3.2 Thresholds of Significance

This impact analysis assumes that a project alternative would have a significant impact under CEQA if implementation would result in one of the following conditions.

- Result in substantial significant environmental impacts due to wasteful, inefficient, or unnecessary consumption of energy resources during project construction or operation.
- Conflict with or obstruct any state/local plan goal, objective, or policy for renewable energy or energy efficiency.

22.3.2.1 Evaluation of Mitigation Impacts

CEQA also requires an evaluation of potential impacts caused by the implementation of mitigation measures. Following the CEQA conclusion for each impact, the chapter analyzes potential impacts associated with implementing both the Compensatory Mitigation Plan (CMP) and the other mitigation measures required to address potential impacts caused by the project. Mitigation impacts are considered in combination with project impacts in determining the overall significance of the project. Additional information regarding the analysis of mitigation measure impacts is provided in Chapter 4, *Framework for the Environmental Analysis*.

22.3.3 Potential for New Energy Resources

Power planning for loads within California is the responsibility of the CEC on a statewide basis and the loads' Local Regulatory Authority (LRA) on a Load Serving Entity (LSE)[3] basis. The CEC develops and adopts an Integrated Energy Policy Report (IEPR) every 2 years and an update every other year. Preparation of the IEPR involves close collaboration with federal, state, and local agencies and a wide variety of interested parties in an extensive public process to identify critical energy issues and develop strategies to address those issues. As part of the IEPR process, 10-year forecasts of end-user electricity and natural demand are developed. The 2021 IEPR was adopted in February 2022 and forecasted demand to the year 2035. The maximum expected annual electrical consumption during construction is estimated to be about 488 MW for Alternative 4a, and maximum annual net electrical use during operations is estimated to be about 993 GWh for Alternative 3, both of which would represent less than 1% demand of the state's daily electricity load respectively (about 35,000 MW).

[3] The CAISO Tariff defines an LSE as: Any entity (or the duly designated agent of such an entity, including, e.g., a Scheduling Coordinator), including a load aggregator or power marketer, that (a) (i) serves End Users within the CAISO Balancing Authority Area and (ii) has been granted authority or has an obligation pursuant to state or local law, regulation, or franchise to sell electric energy to End Users located within the CAISO Balancing Authority Area; (b) (i) is an End User, (ii) has been granted authority pursuant to state or local law or regulation to serve its own Load through the purchase of electric energy from an entity that does not qualify as a Load Serving Entity, and (iii) serves its own Load through purchases of electric energy from an entity that does not qualify as a Load Serving Entity with respect to such purchases of electric energy, or (c) is a federal power marketing authority that serves End Users (California Independent System Operator 2022).

The SWP is considered an LSE for Resource Adequacy (RA) purposes. Pursuant to the RA Program and CAISO Tariff, the SWP submits demand forecasts to CEC and CAISO on a year-ahead and month-ahead basis. The SWP also submits RA compliance demonstrations to the CAISO on a year-ahead and month-ahead basis. In addition, the RA Program includes a 15% Planning Reserve Margin on all firm load. Consequently, the SWP will procure power and capacity for the project through long-term and mid-term contracts, and the CAISO power markets, sufficient to meet the power and RA capacity requirements of the CAISO Tariff and DWR's RA Program. No new or expanded electrical power generation facilities will be developed specifically for the water conveyance project; rather, any additional power needs will be addressed through SWP power purchase programs.

22.3.4 Impacts and Mitigation Approaches

Total construction-related gasoline and diesel fuel consumption for each alternative are summarized in Table 22-7. Power assumptions for the construction of key feature facilities for Alternatives 1, 2a, 2b, and 2c are provided in Table 22-8. Power assumptions for the construction of key feature facilities for Alternatives 3, 4a, 4b, and 4c are provided in Table 22-9. Power assumptions for the construction of key feature facilities for Alternative 5 are provided in Table 22-10. Annual electrical energy use estimates for construction of each alternative are summarized in Table 22-11.

Table 22-7. Total Gasoline and Diesel Estimates for Construction per Alternative

Alternative	Gasoline and Diesel Fuel Use (million gallons)
1	39
2a	51
2b	32
2c	36
3	39
4a	50
4b	33
4c	36
5	48

Table 22-8. Summary of Estimated Electrical Power Load Assumptions for Construction of Key Features in Kilovolt-Amps for Central Alignment (Alternatives 1, 2a, 2b, and 2c)

Facility	Alt 1	Alt 2a	Alt 2b	Alt 2c
Intake A	–	6,000	–	–
Intake B	8,000	8,000	–	8,000
Intake C	8,000	8,000	8,000	6,000
Lambert batch plants	8,000	8,000	8,000	8,000
Twin Cities launch shaft and reusable tunnel material storage and management [a]	61,000	61,000	39,000	39,000
Bouldin Island launch and reception shaft	29,000	29,000	18,000	18,000
New Hope Tract maintenance shaft	1,000	1,000	1,000	1,000
Staten Island maintenance shaft	1,000	1,000	1,000	1,000

Facility	Alt 1	Alt 2a	Alt 2b	Alt 2c
Bacon Island Reception Shaft	5,000	5,000	1,000	5,000
Mandeville Island maintenance shaft	1,000	1,000	1,000	1,000
Southern Complex [b]	71,100	91,100	60,100	60,100
South Delta Conveyance Facilities	2,000	4,000	2,000	2,000
Hood-Franklin Park-and-Ride	359	359	359	359
Rio Vista Park-and-Ride	357	357	357	357
Byron Park-and-Ride	356	356	356	356
Bethany Road Park-and-Ride	356	356	356	356
Charter Way Park-and-Ride	356	356	356	356
Total	196,885	224,885	144,885	150,885

Source: Delta Conveyance Design and Construction Authority 2022a.
Alt = Alternative.
[a] Includes power for the concurrent use of two tunnel boring machines and mechanical heat drying of reusable tunnel material.
[b] Includes power for the concurrent use of three tunnel boring machines under Alternatives 1, 2b, and 2c; four tunnel boring machines under Alternative 2a; and mechanical heat drying of reusable tunnel material.

Table 22-9. Summary of Estimated Electrical Power Load Assumptions for Construction of Key Features in Kilovolt-Amps for Eastern Alignment (Alternatives 3, 4a, 4b, and 4c)

Facility	Alt 3	Alt 4a	Alt 4b	Alt 4c
Intake A	–	6,000	–	–
Intake B	8,000	8,000	–	8,000
Intake C	8,000	8,000	8,000	6,000
Lambert batch plants	8,000	8,000	8,000	8,000
Twin Cities launch shaft and reusable tunnel material storage and management [a]	61,000	61,000	39,000	39,000
Lower Roberts Island launch and reception shaft	29,000	29,000	18,000	18,000
New Hope Tract maintenance shaft	1,000	1,000	1,000	1,000
Canal Ranch Tract maintenance shaft	1,000	1,000	1,000	1,000
Terminous Tract reception shaft	1,000	1,000	1,000	1,000
King Island maintenance shaft	1,000	1,000	1,000	1,000
Upper Jones Tract maintenance shaft	1,000	1,000	1,000	1,000
Southern Complex [b]	71,100	91,100	60,100	60,100
Hood-Franklin Park-and-Ride	359	359	359	359
Byron Park-and-Ride	356	356	356	356
Bethany Road Park-and-Ride	356	356	356	356
Charter Way Park-and-Ride	356	356	356	356
Total	193,528	221,528	141,528	147,528

Source: Delta Conveyance Design and Construction Authority 2022a.
Alt = Alternative.
[a] Includes power for the concurrent use of two tunnel boring machines and mechanical heat drying of reusable tunnel material.
[b] Includes power for the concurrent use of three tunnel boring machines under Alternatives 3, 4b, and 4c; four tunnel boring machines under Alternative 4a; and mechanical heat drying of reusable tunnel material.

Table 22-10. Summary of Estimated Electrical Power Load Assumptions for Construction of Key Features in Kilovolt-Amps for Bethany Reservoir (Alternative 5)

Facility	Alt 5
Intake B	8,000
Intake C	8,000
Lambert batch plants	8,000
Twin Cities double tunnel launch shaft [a]	58,000
Lower Roberts Island double launch shaft [a]	59,000
New Hope Tract maintenance shaft	1,000
Canal Ranch Tract maintenance shaft	1,000
Terminous Tract reception shaft	1,000
King Island maintenance shaft	1,000
Upper Jones Tract maintenance shaft	1,000
Union Island maintenance shaft	1,000
Bethany Reservoir Pumping Plant and Surge Basin (including batch plants)	12,750
Bethany Aqueduct and Bethany Reservoir Discharge Structure	17,200
Hood-Franklin Park-and-Ride	358
Charter Way Park-and-Ride	355
Total	175,663

Source: Delta Conveyance Design and Construction Authority 2022b.
Alt = Alternative.
[a] Includes the concurrent use of power for two tunnel boring machines.

Table 22-11. Estimated Total Temporary Annual and Total Electrical Use Estimates for Construction in Megawatt Hours

Year	Alt 1	Alt 2a	Alt 2b	Alt 2c	Alt 3	Alt 4a	Alt 4b	Alt 4c	Alt 5
PFIY 1	0	0	0	0	0	0	0	0	0
PFIY 2	0	0	0	0	0	0	0	0	0
CY 1	13	7	7	6	13	7	7	6	14
CY 2	1,701	1,706	1,400	1,706	1,701	1,706	1,404	1,706	603
CY 3	4,716	4,700	3,153	4,726	4,716	4,698	3,143	4,697	4,525
CY 4	4,788	4,761	3,217	4,758	4,782	4,755	11,196	4,753	4,377
CY 5	110,094	110,093	58,259	67,379	109,858	110,234	57,572	67,316	30,786
CY 6	281,193	279,152	196,530	167,476	280,275	278,497	197,976	166,831	171,446
CY 7	448,492	448,490	263,884	265,216	447,358	445,848	262,899	264,106	196,949
CY 8	464,060	514,680	234,686	274,011	463,499	487,975	231,639	273,452	195,541
CY 9	390,357	427,017	183,518	215,119	390,013	401,551	165,076	214,793	195,594
CY 10	282,561	372,335	71,696	145,105	281,902	372,588	113,223	165,334	194,032
CY 11	105,446	255,615	3,284	29,539	160,470	301,502	57,672	57,107	111,180
CY 12	0	79,308	0	0	92,273	171,249	1,675	53,987	61,438
CY 13	0	0	0	0	54,754	92,185	0	8,632	8
CY 14	0	0	0	0	0	44,630	0	0	0
Total	2,093,421	2,497,864	1,019,633	1,175,041	2,291,614	2,717,425	1,103,480	1,282,720	1,166,491

Alt = Alternative; CY = construction year; PFIY = preliminary field investigation year.

Table 22-12 summarizes annual average long-term operational SWP energy generation, energy use, and net energy consumption for each alternative compared to existing conditions. Table 22-13 summarizes annual average long-term operational CVP energy generation, energy use, and net energy consumption for each alternative compared to existing conditions. As shown in Table 22-13, CVP energy generation and consumption results in a surplus of energy. Consistent with existing conditions, the net operational energy consumption for all project alternatives also results in a surplus of CVP energy. Appendix 22A, *SWP and CVP Energy Generation and Consumption by Facility*, provides a breakdown of both consumption and generation by facility. Details about the model and processing tool computational methods are in Appendix 5A.

Table 22-12. Summary of Estimated Annual Average SWP Energy Generation, Energy Use, and Net Energy Consumption in Gigawatt Hours for Operation of the Alternatives Compared to Existing Conditions

SWP Energy	EC	NP	Alt 1	Alt 2a	Alt 2b	Alt 2c	Alt 3	Alt 4a	Alt 4b	Alt 4c	Alt 5
SWP Generation	3,925	3,766	4,183	4,176	4,122	4,160	4,183	4,176	4,122	4,160	4,177
SWP Use	6,744	6,223	7,800	7,769	7,568	7,717	7,803	7,776	7,565	7,717	7,989
SWP Net Energy Consumption (+) or Surplus (-)	+2,819	+2,457	+3,617	+3,593	+3,446	+3,557	+3,620	+3,600	+3,443	+3,557	+3,812
GWh Change from EC Consumption (+) or Surplus (-)	–	-362	+798	+774	+627	+738	+801	+781	+624	+738	+993
% Change from EC	–	-13%	28%	27%	22%	26%	28%	28%	22%	26%	35%

Alt = Alternative; EC = Existing Conditions; NP = No Project; SWP = State Water Project; GWh = gigawatt hours.

Table 22-13. Summary of Estimated Annual Average CVP Energy Generation, Energy Use, and Net Energy Consumption in Gigawatt Hours for Operation of the Alternatives Compared to Existing Conditions

CVP Energy	EC	NP	Alt 1	Alt 2a	Alt 2b	Alt 2c	Alt 3	Alt 4a	Alt 4b	Alt 4c	Alt 5
CVP Generation	4,645	4,579	4,658	4,667	4,657	4,660	4,658	4,667	4,657	4,660	4,658
CVP Use	1,333	1,034	1,369	1,401	1,355	1,366	1,369	1,402	1,355	1,366	1,370
CVP Net Energy Consumption (+) or Surplus (-)	-3,312	-3,545	-3,289	-3,266	-3,302	-3,294	-3,289	-3,265	-3,302	-3,294	-3,288
GWh Change from EC Consumption (+) or Surplus (-)	–	+233	-23	-46	-10	-18	-23	-47	-10	-18	-24
% Change from EC	–	7%	-1%	-1%	-58%	-1%	-1%	-1%	0%	-1%	-1%

Alt = Alternative; CVP = Central Valley Project; EC = Existing Conditions; NP = No Project.

Table 22-14 provides a summary of annual average gasoline and diesel consumption for operations and maintenance activities associated with each project alternative.

Table 22-14. Summary of Annual Average Gasoline and Diesel Estimates for Operations and Maintenance per Alternative under Existing Conditions

Alternative	Gasoline and Diesel Fuel Use (gallons)
1	35,322
2a	40,851
2b	31,251
2c	35,161
3	35,056
4a	40,514
4b	30,917
4c	34,891
5	25,554

22.3.4.1 No Project Alternative

As described in Chapter 3, *Description of the Proposed Project and Alternatives,* CEQA Guidelines Section 15126.6 directs that an EIR evaluate a specific alternative of "no project" along with its impact. The No Project Alternative in this Draft EIR represents the circumstances under which the project (or project alternative) does not proceed and considers predictable actions, such as projects, plans, and programs, that would be predicted to occur in the foreseeable future if the Delta Conveyance Project is not constructed and operated. This description of the environmental conditions under the No Project Alternative first considers how energy could change over time and then discusses how other predictable actions could affect energy.

Future Energy Conditions

For energy resources, future conditions are not anticipated to substantially change compared to existing conditions because policies regarding efficiencies in energy use and development of new energy resources are not expected to change if the project (or project alternative) does not proceed. However, indirect impacts on energy within the Delta may occur under the No Project Alternative as the result of changes in upstream hydrologic conditions, sea level rise, and continued seismic risk to infrastructure. In addition, immediate, and potentially long-term, changes in energy resources could occur under the No Project Alternative because of seismic events and the inundation of infrastructure within the Delta. Provisions have been included in legislation (e.g., Water Code Section 85307 (d)) to address the needs of Delta energy development, storage, transmission, and distribution that could potentially be affected by increased flooding in the Delta.

Predictable Actions by Others

A list and description of actions included as part of the No Project Alternative are provided in Appendix 3C, *Defining Existing Conditions, No Project Alternative, and Cumulative Impact Conditions*. As described in Chapter 4, the No Project Alternative analyses focus on identifying the additional water supply-related actions public water agencies may opt to follow if the Delta Conveyance Project does not occur.

Public water agencies participating in the Delta Conveyance Project have been grouped into four geographic regions. The water agencies within each geographic region would likely pursue a similar suite of water supply projects under the No Project Alternative (Appendix 3C). Activities associated with the various water supply projects could result in the short-term and long-term consumption of energy. Short-term energy usage would vary depending on the level of activity, length of the activity, specific operations, types of equipment, and number of personnel. Long-term energy usage would increase due to facility operations.

The specific types and amounts of construction and operational activities would differ depending on the water supply project. Table 22-15 summarizes potential construction and operational energy usage by the project categories based on a review of other similar project types and the geographic areas in which the projects are expected to be required.

Table 22-15. Impacts on Energy from the Plans, Policies, and Programs for the No Project Alternative

Project Type	Geographic Area	Potential Construction Short-Term Energy Usage	Potential Operational Long-Term Energy Usage
Increased/ accelerated desalination	Northern coastal, southern coastal	Diesel, gasoline and electrical power supplies for construction equipment, vehicles, employee commutes required for facility construction and distribution pipeline installation.	Diesel and gasoline usage for maintenance and employee vehicle trips. Diesel, gasoline, and electrical power supplies for long-term facility operations including employee commute, facility maintenance, and distribution (e.g., pump stations).
Groundwater recovery (brackish water desal)	Northern inland, southern coastal, southern inland	Diesel, gasoline and electrical power supplies for construction equipment, vehicles, and employee commutes for facility construction and distribution pipeline installation.	Diesel and gasoline usage for maintenance and employee vehicle trips. Diesel, gasoline, and electrical power supplies for long-term facility operations including employee commute, facility maintenance, well pumps, water treatment, and distribution (e.g., pump stations).
Groundwater management	Northern coastal, southern coastal	Diesel, gasoline and electrical power supplies for construction equipment, vehicles, and employee commutes for facility construction and distribution pipeline installation.	Diesel and gasoline usage for maintenance and employee vehicle trips. Diesel, gasoline, and electrical power supplies for long-term facility operations including employee commute, facility maintenance, well pumps, water treatment, and distribution (e.g., pump stations).
Water recycling	Northern coastal, northern inland, southern coastal, southern inland	Diesel, gasoline and electrical power supplies for construction equipment, vehicles, employee commutes required for treatment facility construction and distribution pipeline installation.	Diesel and gasoline usage for maintenance and employee vehicle trips. Diesel, gasoline, and electrical power supplies for long-term facility operations including employee commute, facility maintenance, water treatment, and distribution (e.g., pump stations).

Project Type	Geographic Area	Potential Construction Short-Term Energy Usage	Potential Operational Long-Term Energy Usage
Water conservation/ water use efficiency measures	Northern coastal, southern coastal, southern inland	Minor diesel, gasoline, and electrical power supplies for construction equipment, vehicles, and employee commutes required for construction.	Potential for reduced energy consumption from increases in operational efficiencies.

Construction of desalination projects, groundwater management projects, water recycling projects, and water use efficiency projects to meet water suppliers' needs would result in the short-term consumption of energy from construction of the facilities and would vary depending on the nature and duration of construction. With the possible exception of water use efficiency projects, long-term operational energy consumption from operations and maintenance of these facilities would be expected to increase, although not to the extent that regional supplies would be substantially affected. Most of the existing programs and projects comprising the No Project Alternative would not require substantial operations and maintenance activities or the use of mechanical equipment in the same manner as the proposed facilities and would therefore not result in wasteful or unnecessary consumption of energy resources or result in a substantial net increase of energy consumption. Additionally, key programs such as the 2017 Climate Change Scoping Plan and California's Renewables Portfolio Standard include goals and strategies to power the state with renewable energy sources, further increasing energy resiliency for these projects. Under the No Project Alternative, if additional desalination plants are required to meet regional and local water supply demand, the energy requirements for water supply production could increase compared to existing conditions because of the relatively high energy demand required for these types of facilities.

SWP and CVP Pumping

Calculated annual electricity consumption for SWP and CVP pumping under existing conditions and the No Project Alternative are shown in Tables 22-12 and 22-13. There would be no substantial changes in the operations of the existing CVP and SWP hydroelectric generation facilities or pumping facilities; however, as indicated, SWP energy consumption is expected to be lower under the No Project Alternative. It is projected that the net energy consumption in 2040 would be somewhat less than net consumption under 2020 conditions (i.e., would result in additional surplus energy) because of reduced system deliveries and other energy efficiencies, resulting in a reduction in overall energy consumption (see Chapter 6, *Water Supply*).

22.3.4.2 Impacts of the Project Alternatives on Energy

Impact ENG-1: Result in Substantial Significant Environmental Impacts Due to Wasteful, Inefficient, or Unnecessary Consumption of Energy Resources during Project Construction or Operation

All Project Alternatives

Project Construction

Diesel, gasoline, and electrical power supplies would be needed at construction sites during the 12-year construction period for Alternatives 1 and 2c; 13-year construction period for Alternatives 2a, 2b, 3, 4b, 4c, and 5; and 14-year construction period for Alternative 4a. Diesel and gasoline would be used to power heavy-duty construction equipment, construction worker vehicles, haul trucks, locomotives, and marine vessels. Electricity would be needed to support large construction equipment (e.g., tunnel boring machines), concrete batch plants, small tools, and construction-support facilities, including construction trailers, temporary lighting, and electric vehicle charging stations.

Diesel and gasoline consumption associated with off-road and on-road equipment over the entire construction period would range between 32 and 51 million gallons (Table 22-7). A large portion of the diesel and gasoline fuel consumption would be attributed to on-road vehicles transporting materials to and from the project site and off-road heavy equipment. Initial project design considered access suitability for major project features, including the location of ancillary construction-support facilities. Given the extensive footprint of the project, transportation efficiencies have been incorporated into each alternative to reduce the daily effect of truck trips on local roadways and to provide for the flow of construction materials to each site in an efficient manner. Site access and logistics would be largely focused on identifying appropriate transportation modes and routes to ensure that manpower, goods, and services would be transported in effective ways to minimize impacts on the environment and residents of the Delta. This would be accomplished by sequencing of project facilities and incorporating construction material hauling by rail, limited use of barges (at intakes only for placement of riprap and removing soil near the end of construction and during limited field investigations) and establishing park-and-ride facilities for employee trips.

Additionally, as discussed in Chapter 23, construction activities would include implementation of Environmental Commitments EC-7: *Off-Road Heavy-Duty Engines,* EC-8: *On-Road Haul Trucks,* EC-9: *On-site Locomotives,* EC-10: *Marine Vessels,* and EC-13: *DWR Best Management Practices to Reduce GHG Emissions* (Appendix 3B, *Environmental Commitments and Best Management Practices*), which include construction best management practices (BMPs) such as minimizing idling times, maintaining all construction equipment in proper working condition, using renewable diesel, and implementing other measures to reduce pollutants. Other renewable features have also been incorporated into project construction including the installation of solar panels at the park-and-ride lots to power electric vans to move employees to construction sites and requiring the use of commercially available electric or hybrid vehicles. These measures would help to improve equipment efficiency, promote the use of renewable energy, and result in an overall reduction of energy use. Furthermore, due to the high cost of fuel and with standard federal, state, and local policies and regulations pertaining to construction equipment, impacts related to wasteful, inefficient, and unnecessary use of energy resources would be further reduced because construction contractors would purchase fuel from local suppliers and would conserve the use of their fuel supplies to minimize costs.

Table 22-11 indicates that, depending on the alternative, total electrical energy consumption during construction would range between 1,019,633 and 2,717,425 MWh. The peak annual consumption would occur for Alternative 2a, with an estimated use of 514,680 MWh occurring during construction year 8. Maximum usage for each alternative would occur during tunnel boring activity, as shown in Tables 22-8, 22-9, and 22-10. It is assumed that power needed during construction would be supplied by the same power portfolio as is used for current SWP operations. As indicated in Section 22.3.3, *Potential for New Energy Resources*, electrical energy consumption for construction of the alternatives is minimal when compared to the total amount of available energy sources and would represent less than 1% demand of the state's daily electricity load.

As discussed, construction activities would include control measures to improve equipment efficiency and reduce energy use. Once construction is complete, the need for additional electricity services for boring operations and other construction-related appurtenances would cease, and any new facilities that were temporarily expanded to accommodate construction would be removed as appropriate. Construction of the project alternatives would therefore not result in the wasteful, inefficient, or unnecessary consumption of energy.

Field investigations such as geotechnical investigations needed for constructing conveyance facilities would require temporary use of energy for drill rigs and monitoring equipment. These demands on energy sources would contribute to the overall construction energy demand but would not result in substantial energy use or result in wasteful or inefficient use of energy because the environmental commitments and BMPs indicated above would reduce energy demand to the extent possible.

Operations and Maintenance

Power supplies would be needed for Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c during operations of the intakes, the Southern Complex control structures, and the South Delta Pumping Plant. For Alternative 5, power would be needed for the intakes, the Bethany Reservoir Pumping Plant, and the Bethany Reservoir Discharge Structure. Power would also be required for mechanical equipment (e.g., operable gates, screen cleaners, pumps, cathodic protection systems), supervisory control and data acquisition (SCADA) systems, and on-site buildings and lights. Operation of project alternatives is expected to result in an increase of total net SWP energy consumption ranging from about 624 GWh for Alternative 4b (22% increase over existing conditions) to 993 GWh for Alternative 5 (35% increase over existing conditions). Regarding CVP energy consumption and generation, operation of project alternatives is expected to result in either no change or a reduction of CVP energy consumption for all project alternatives.

The SWP's power portfolio currently consists of 65% renewable energy from its own carbon-free hydroelectric generation and from renewable energy purchases like solar power. Because the alternatives would be supplied by the same power portfolio as is used for current SWP operations, operation of all of the alternatives would be consistent with DWR's commitment to energy efficiencies, as established in Update 2020. Update 2020 includes measures to increase operational efficiencies such as Measure OP-2, *Unit Efficiency Improvements,* and Measure OP-3, *REPP*, and therefore would not result in wasteful or inefficient consumption of energy.

Project operations would be designed and managed to maximize efficient energy use. DWR currently schedules the SWP's need to serve load and to supply generation based on the CAISO's market timelines through an extensive computerized network. Such schedules attempt to minimize the market costs of operating the SWP while aligning with the State's goals to support renewable energy, such as using operating flexibility (storage reservoirs) to enable solar to be dispatched by CAISO during solar peak hours as opposed to releasing SWP water and generating during that time, which could compete with solar. DWR would continue to operate under these conditions to maximize the use of renewable energy. Additionally, efficiencies have been incorporated into operational measures such as using light emitting diode (commonly called LED) lighting for both temporary and permanent structures, selecting high-efficiency pumps, using vacuum assisted pumping, using water-cooled pumping plant motors, using high-voltage transmission lines (where available), and designing the tunnel to convey water into the Southern Forebay via gravity flow under certain Sacramento River flow conditions when possible (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c only).

Operation of the project alternatives would also result in an increase in the consumption of fuel (gasoline and diesel) due to an increase of maintenance activities that would be needed. Table 22-14 summarizes fuel consumption for maintenance of project alternatives. Estimates were quantified using 2020 conditions to define baseline conditions. Based on current information, it is projected that the consumption of fuel for equipment and vehicle operation in future years (currently estimated for the year 2040) would be lower than under 2020 conditions. This decrease is attributable to improvements in engine technology and regulations to reduce combustion emissions and more efficient vehicles and electric-powered vehicles being added to the fleet.

Accordingly, though project operations and maintenance would result in an increase in electricity and fuel consumption, implementation of the project alternatives would not result in wasteful, inefficient, or unnecessary consumption of energy.

CEQA Conclusion—All Project Alternatives

Table 22-11 indicates that the estimated construction power use for the construction period would range between 1,019,633 and 2,717,425 MWh. The peak annual consumption would occur for Alternative 2a, with an estimated use of 514,680 MWh occurring during construction year 8 concurrent with expected tunnel boring activity. It is estimated that Alternative 2a would consume the most gasoline and diesel, estimated at approximately 51 million gallons over the entire construction period (see Table 22-7).

As discussed in Chapter 23, construction activities would include implementation of Environmental Commitments EC-7: *Off-Road Heavy-Duty Engines,* EC-8: *On-Road Haul Trucks,* EC-9: *On-site Locomotives,* EC-10: *Marine Vessels,* and EC-13: *DWR Best Management Practices to Reduce GHG Emissions* (Appendix 3B), which include construction BMPs such as minimizing idling times, maintaining all construction equipment in proper working condition, using renewable diesel, and implementing other measures to reduce pollutants. Additionally, Mitigation Measure AQ-9: *Develop and Implement a GHG Reduction Plan to Reduce GHG Emissions from Construction and Net CVP Operational Pumping to Net Zero* requires that DWR develops and implements a GHG reduction plan to reduce emissions from construction and new CVP operational pumping to net zero. These measures would help to improve equipment efficiency and reduce energy use, as well as demonstrate DWR's commitment to using electricity from renewable resources. Furthermore, due to the high cost of fuel and with standard federal, state, and local policies and regulations pertaining to construction equipment, impacts related to wasteful, inefficient, and unnecessary use of energy resources would be further reduced because construction contractors would purchase fuel from local suppliers and would conserve the use of their fuel supplies to minimize costs.

Operational energy efficiencies would include but would not be limited to the following: using LED lighting for both temporary and permanent structures; selecting high-efficiency pumps; using vacuum assisted pumping (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c only); using water-cooled pumping plant motors; using high-voltage transmission lines (where available); designing the tunnel to convey water into the Southern Forebay via gravity flow under certain Sacramento River flow conditions when possible (Alternatives 1, 2a, 2b, 2c, 3, 4a, 4b, and 4c only); and using hydraulic control gates designed for minimal head loss while preserving operational functionality. Accordingly, although project implementation would result in an increase in energy consumption, project alternatives would not result in the wasteful, inefficient, or unnecessary consumption of energy, and impacts would be less than significant.

Mitigation Impacts

Compensatory Mitigation

Although the CMP described in Appendix 3F, *Compensatory Mitigation Plan for Special-Status Species and Aquatic Resources*, does not act as mitigation for impacts on energy from project construction or operations, its implementation could result in impacts on energy.

Actions undertaken for compensatory mitigation would restore three freshwater ponds along Interstate (I-) 5, wetland, open-water, and upland natural communities on Bouldin Island, and tidal wetland and channel margin habitat in the North Delta Arc, as described in Appendix 3F. Compensatory mitigation would convert existing agriculture land on Bouldin Island to wetlands, riparian habitat, ponds, and grassland. For the I-5 ponds, it is proposed that the existing grasslands, riparian habitat, wetlands, and ponds would be replaced by improved grassland, wetland, riparian, and open-water habitat. Tidal wetland and channel margin habitat would be created within the North Delta Arc. The types of construction activities and equipment needed for habitat restoration are similar to what would be required for construction of the project, although they would be of substantially lesser magnitude. Table 22-16 summarizes construction-related gasoline and diesel fuel consumption for compensatory mitigation restoration activities, which are expected to occur in 2026 through 2028.

Table 22-16. Estimated Gallons of Gasoline and Diesel for Construction of Compensatory Mitigation Sites

Year	I-5 Ponds	Bouldin	Total
2026	137,584	25,339	162,924
2027	151,575	28,425	180,000
2028	1,303	0	1,303
Total	290,462	53,764	344,227

Source: ICF modeling.
I-5 = Interstate 5.

Following restoration, future site visits requiring vehicle trips, such as biological monitoring, would likely occur a few times per year. Pond excavation may also be needed. These activities required to monitor and maintain the compensatory mitigation sites would be less frequent and intense than current on-site agricultural practices. Accordingly, maintenance of the compensatory mitigation sites would not result in additional consumption of energy resources beyond what is currently occurring and would therefore not result in the wasteful, inefficient, or unnecessary consumption of energy. Therefore, implementation of compensatory mitigation would not change the overall impact conclusion of less than significant.

Other Mitigation Measures

Implementation of some mitigation measures could include construction and other ground-disturbing activities. These activities would require construction-related gasoline and diesel fuel consumption like what would be required for construction of the project, although they would be of substantially lesser magnitude. Implementation of mitigation measures could also result in additional electric energy consumption through temporary lighting and use of electric-powered equipment. As previously discussed, environmental commitments and BMPs would improve equipment efficiency and reduce energy use, and contractors would reduce fuel consumption to minimize costs. Similarly, it is expected that high-efficiency lighting and energy-efficient electrical equipment would be used to minimize electric energy consumption. Therefore, impacts due to wasteful, inefficient, or unnecessary consumption of energy resources from other mitigation measures would be less than significant.

Overall, the impacts due to wasteful, inefficient, or unnecessary consumption of energy resources, during construction and operation of compensatory mitigation and implementation of other mitigation measures, combined with project alternatives, would not change the impact from less than significant.

Impact ENG-2: Conflict with or Obstruct Any State/Local Plan, Goal, Objective, or Policy for Renewable Energy or Energy Efficiency

All Project Alternatives

Project Construction

As described in Impact ENG-1, construction activities would incorporate efficiencies into each alternative to reduce the daily effect of truck trips on local roadways and to provide for the flow of construction materials to each site in an efficient manner. Additionally, electricity would be used during construction to the extent possible and once construction is complete, the need for additional electricity services for tunnel boring machine operations and other construction-related appurtenances would cease, and any new facilities that were temporarily expanded to accommodate construction would be removed as appropriate. Environmental Commitment EC-13: *DWR Best Management Practices to Reduce GHG Emissions* includes BMPs that would reduce pollutants and would also improve construction equipment efficiency, reducing energy use. These BMPs are consistent with Construction Emissions Reduction Measures to reduce project-level emissions as established in DWR's Update 2020, Measure CO-1, *Construction BMPs and Regulations*.

Operations and Maintenance

Power for operation of all project alternatives would be supplied by the same power portfolio as is used for current SWP operations. The increase in power needed to move water through the new water conveyance facilities would be procured by DWR, and the energy requirements would be directly linked to the SWP and CVP exports.

Because project alternatives would result in additional energy demands on the SWP system of 15 GWh per year or greater, the project must perform additional analyses with DWR's SWP Power & Risk Office to determine whether the additional energy demand would require DWR to take additional steps beyond those identified in DWR's Update 2020 to achieve its emissions reduction goals. Consistent with DWR project-level cumulative GHG emission analysis requirements and to complete this consultation, a GHG Emission Reduction Plan Consistency Determination Form from DWR's Update 2020 was completed (Appendix 23E, *Assessment Form for Consistency with GHG Emissions Reduction Plan*). Consultation with the Power & Risk Office has occurred to verify that revisions to DWR's REPP are not needed to accommodate the additional energy demand, of approximately 15 GWh per year, associated with the project. As such, operational emissions from

(1) increased SWP pumping and (2) project maintenance are addressed, consistent with DWR's Update 2020, as discussed further in Chapter 23.

DWR would continue to update strategies for further reduction consistent with legislative changes similar to those established in SB 100, which sets a 2045 goal of powering all retail electricity sold in California and state agency electricity needs with renewable and zero-carbon resources. The goal of the program is to achieve a 50% renewable resources target by December 2026, and a 60% renewable target by December 2030. Additionally, because electric power in California already relies heavily on renewable energy sources, and, as explained, its overall renewable energy portfolio is and will continue to grow as a percentage of electric power. Given that the project would incorporate design and operational efficiencies described above in Impact ENG-1 and energy would be supplied from existing SWP and CVP sources, it would not conflict with any state/local plan, goal, objective or policy for renewable energy or energy efficiency.

CEQA Conclusion—All Project Alternatives

Construction would incorporate efficiencies into each alternative, including measures that are consistent with DWR's Update 2020. The increase in power needed to move water through the new water conveyance facilities would be procured by DWR, and the energy requirements would be directly linked to SWP and CVP exports. DWR would continue to update strategies for further reduction consistent with legislative changes, such as those established in SB 100, which sets a 2045 goal of powering all retail electricity sold in California and state agency electricity needs with renewable and zero-carbon resources. The goal of the program is to achieve a 50% renewable resources target by December 2026, and a 60% renewable target by December 2030. Given that the project would use energy from SWP and CVP sources, it would not conflict with any state/local plan, goal, objective, or policy for renewable energy or energy efficiency, and there would be no impact.

Mitigation Impacts

Compensatory Mitigation

Although the CMP described in Appendix 3F does not act as mitigation for impacts on energy from project construction or operations, its implementation could result in impacts on energy.

Actions undertaken for compensatory mitigation would restore three freshwater ponds along I-5, wetland, open-water, and upland natural communities on Bouldin Island, and tidal wetland and channel margin habitat in the North Delta Arc, as described in Appendix 3F. The activities required to construct, monitor, and maintain the compensatory mitigation sites would be less intense than current on-site agricultural practices. Accordingly, construction and maintenance of the compensatory mitigation sites would not result in an increase of power or fuel consumption and would therefore not conflict with existing plans, goals, objectives, or policies for renewable energy or energy efficiency. Therefore, implementation of compensatory mitigation would not change the overall impact conclusion of no impact.

Other Mitigation Measures

As described in Impact ENG-1, construction of some mitigation measures would require consumption of gasoline, diesel, and electrical energy. The energy required to implement some mitigation measures would be substantially less than that required for construction and operation of the project and would incorporate efficiency measures discussed in Impact ENG-1. Furthermore, activities required to construct other mitigation measures would be less intense than current on-site agricultural practices. Therefore, construction of other mitigation measures would not result in an increase of power or fuel consumption and would therefore not conflict with existing plans, goals, objectives, or policies for renewable energy or energy efficiency, and would not change the no impact conclusion.

Overall, construction of compensatory mitigation and implementation of other mitigation measures, combined with project alternatives, would not conflict with existing plans, goals, objectives, or policies for renewable energy or energy efficiency, and would not change the no impact conclusion.

22.3.5 Cumulative Analysis

This cumulative analysis considers other past, present, and probable future projects that could affect the same resources during the same timeframe as the project alternatives, resulting in a cumulative energy impact. Energy use and local communities' demands for energy are expected to increase as a result of reasonably foreseeable future projects related to population growth and energy uses. It is expected that some changes related to energy use would take place although it is assumed that all future projects would include design and construction practices to avoid or minimize potential energy effects, as required by relevant local and state policies and guidelines such as county general plans, SB 100, and CEQA Guidelines Appendix F.

Cumulative impacts of the project alternatives on electrical energy use within the study area are expected to change as a result of past, present, and reasonably foreseeable future projects related to population growth and changes in economic activity in the study area (Chapter 31).

When the effects of the project alternatives' increased energy use are considered in combination with the potential effects of projects listed in Appendix 3C, the cumulative energy use effects could be considerable because many of the other projects would also result in short-term and/or long-term increases in energy use. The specific programs, projects, and policies are identified below, based on the potential to contribute to an energy impact that would be cumulatively considerable. The potential for cumulative impacts on energy generation and use are described for the alternative's operational effects on energy use within the Delta and energy use in SWP and CVP south-of-Delta region water deliveries related to the water conveyance facilities.

Table 22-17 summarizes foreseeable projects and programs that may affect energy resources.

Table 22-17. Cumulative Impacts on Energy from Plans, Policies, and Programs

Program/Project	Agency	Status	Description	Impacts on Energy
Phase 1: Greenhouse Gas Emissions Reduction Plan	DWR	Ongoing	The Greenhouse Gas Emissions Reduction Plan is the first phase of DWR's CAP to guide decision making related to energy use and GHG emissions.	Potential short-term impacts from implementation of projects. May result in increased system resiliency and availability of energy resources.
South Fork Feather Project	South Fork Feather Project	Ongoing	The South Fork Feather Project (FERC Project 2088) is a water supply/power project.	May reduce energy generation or require additional energy.

Program/Project	Agency	Status	Description	Impacts on Energy
Bucks Creek Hydroelectric Project	FERC, PG&E, and the City of Santa Clara	Ongoing	The Bucks Creek Hydroelectric Project (FERC Project 619) is an 84.8-MW project.	May reduce energy generation or require additional energy.
Yuba River Watershed Hydroelectric Projects	FERC, Nevada Irrigation District, PG&E	Ongoing	The Nevada Irrigation District is applying for a new license for the Yuba-Bear Project (FERC Project 2266), and PG&E is applying for the Drum-Spaulding Project (FERC Project 2310).	May reduce energy generation or require additional energy.
Yuba River Development Project Relicensing	FERC, Yuba County Water Agency	Ongoing	The Yuba County Water Agency is seeking to renew its 50-year FERC license for the Yuba River Development Project (FERC Project 2246).	May reduce energy generation or require additional energy.
Upper North Fork Feather River Hydroelectric Project	FERC, PG&E	Ongoing	The Upper North Fork Feather River Hydroelectric Project (FERC Project 2105) is a 362.3-MW hydroelectric project located on the North Fork Feather River in Plumas County.	May reduce energy generation or require additional energy.
DeSabla-Centerville Hydroelectric Project	FERC, PG&E	Ongoing	The DeSabla-Centerville Hydroelectric Project (FERC Project 803) is located on Butte Creek and the West Branch Feather River.	May reduce energy generation or require additional energy.
Don Pedro Hydroelectric Project	TID, MID, FERC	Ongoing	The Don Pedro Hydroelectric Project is a 168-MW hydroelectric project (FERC Project 2299) located on the Tuolumne River in western Tuolumne County.	May reduce energy generation or require additional energy.
Del Puerto Canyon Reservoir	San Joaquin River Exchange Contractors Water Authority, DPWD	Planning	DPWD and the Exchange Contractors are partnering to construct and operate the Del Puerto Canyon Reservoir, an 800-acre reservoir that would store up to 82,000 AF of water.	Temporary increase in energy demand. May reduce or increase long-term energy demand.
California Water Plan Update 2018	DWR	Ongoing	The California Water Plan presents basic data and information on California's water resources to quantify the gap between water supplies and uses. The Plan also identifies and evaluates existing and proposed statewide demand management and water supply augmentation programs and projects to address the state's water needs.	Potential short-term impacts from implementation of projects. May result in reduced or increased use of energy resources.
Delta Levees Flood Protection Program	DWR	Ongoing	The Delta Levees Flood Protection Program is a grants program that works with more than 60 reclamation districts in the Delta and Suisun Marsh to maintain and improve the flood control system and provide protection to public and private investments in the Delta including water supply, habitat, and wildlife.	Potential short-term impacts from temporary increase in energy consumption from implementation of projects.

Program/Project	Agency	Status	Description	Impacts on Energy
Levee Repairs Program	DWR	Ongoing	DWR is conducting geotechnical exploration, testing, and analysis of state and federal levees that protect the highly populated urban areas of greater Sacramento, Stockton/Lathrop, and Marysville/Yuba City.	Potential short-term impacts from temporary increase in energy consumption from implementation of projects.
Lower Yuba River Accord	DWR and Yuba County Water Agency	Ongoing	The Lower Yuba River Accord is a collaborative effort among environmental interests, fisheries agencies, and water agencies intended to resolve instream flow issues associated with operation of the Yuba Project in a way that would protect and enhance lower Yuba River fisheries and local water supply reliability. It also provides revenues for local flood control and water supply projects, improves statewide water supply reliability, and provides water for protection and restoration purposes in the Delta.	May reduce energy generation or require additional energy.
Los Vaqueros Reservoir Expansion	Reclamation, DWR, and Contra Costa Water District	Planning	The Los Vaqueros Reservoir Expansion Project consists of enlarging the existing Los Vaqueros Reservoir.	Potential short-term impacts from temporary increase in energy consumption from implementation. May reduce energy generation or require additional energy during operations
Central Valley Joint Venture Program	CVJV	Ongoing	CVJV provides guidance and facilitates grant funding to accomplish its habitat goals and objectives.	Potential short-term impacts from temporary increase in energy consumption from implementation of projects.
Seawater Desalination Project at Huntington Beach	City of Huntington Beach	Planning	The Seawater Desalination Project at Huntington Beach is proposed for the site of the existing Huntington Beach Generating Station. As of 2020, the coastal development permit is on appeal at the California Coastal Commission, and the NPDES permit renewal public hearing with the Santa Ana Regional Water Quality Control Board is postponed.	Potential short-term impacts from temporary increase in energy consumption from implementation. May reduce energy generation or require additional energy during operations.

Program/Project	Agency	Status	Description	Impacts on Energy
Canal Modernization Project	Contra Costa Water District	Planning	Contra Costa Water District's Canal Modernization Project will replace the canal with a pipeline along a portion of the 48-mile Contra Costa Canal near Oakley.	Potential short-term impacts from temporary increase in energy consumption from implementation. May reduce energy generation or require additional energy during operations.
Bay Area Regional Desalination Project	East Bay Municipal Utility District, Contra Costa Water District, Santa Clara Valley Water District, and San Francisco Public Utilities Commission	Planning	The Bay Area's four largest water agencies are jointly exploring the development of regional desalination facilities that would benefit Bay Area residents and businesses served by these agencies.	Potential short-term impacts from temporary increase in energy consumption from implementation. May reduce energy generation or require additional energy during operations.
Carlsbad Seawater Desalination Plant	City of Carlsbad	Ongoing	The Carlsbad Seawater Desalination Plant is at the site of the former Encina Power Station. Construction of the plant began in late 2012 and pipeline construction began in spring of 2013. The desalination plant began delivering water to San Diego in December 2015.	May reduce energy generation or require additional energy during operations.
Folsom Lake Temperature Control Device	El Dorado Irrigation District	Planning	El Dorado Irrigation District, in collaboration with Reclamation, proposes to construct facilities on the bank of Folsom Lake to withdraw water from the warm upper reaches of the lake while preserving the cold water pool at the bottom of the lake to protect downstream aquatic species.	Potential short-term impacts from temporary increase in energy consumption from implementation. May reduce energy generation or require additional energy during operations.
Battle Creek Salmon and Steelhead Restoration Project	Reclamation and State Water Board	Planning	Construction of the Battle Creek Salmon and Steelhead Restoration Project was initiated in 2009 to reestablish approximately 42 miles of prime salmon and steelhead habitat on Battle Creek, plus an additional 6 miles on its tributaries.	Potential short-term impacts from temporary increase in energy consumption from implementation. May reduce energy generation or require additional energy during operations.
Sacramento River Bank Protection Project	USACE	Planning	The Sacramento River Bank Protection Project is a long-term flood risk management project designed to enhance public safety and help protect property along the Sacramento River and its tributaries.	Potential short-term impacts from temporary increase in energy consumption from implementation.

Program/Project	Agency	Status	Description	Impacts on Energy
Suisun Bay Channel Operations and Maintenance	USACE	Ongoing	The project provides for annual maintenance dredging of the main channel, 300 feet wide and 35 feet deep at Mean Lower Low Water, from the Carquinez Strait at Martinez to Pittsburg (called Suisun Bay Channel), and maintenance dredging of New York Slough Channel farther upstream to Antioch (a distance of 17 miles). The project also provides annual maintenance dredging for a channel 250 feet wide and 20 feet deep south of Seal Islands, from the main channel at Point Edith to the main channel again at Port Chicago at mile 6.	Potential short-term impacts from increase in energy consumption during implementation.
Suisun Channel (Slough) Operation and Maintenance	USACE	Ongoing	The Suisun Channel operations and maintenance provide for maintenance dredging of an entrance channel in Suisun Bay 200 feet wide and 8 feet deep, and thence a channel 100 to 125 feet wide and 8 feet deep for 13 miles to the head of navigation at the City of Suisun, with a turning basin. This shallow draft channel is maintained on an infrequent basis.	Potential short-term impacts from increase in energy consumption during implementation.
San Francisco Bay to Stockton Deep Water Ship Channel Project	USACE, Port of Stockton, and Contra Costa County Water Agency	Planning	The San Francisco Bay to Stockton Deep Water Ship Channel Project consists of altering the depth of the deep draft navigation route.	Potential short-term impacts from increase in energy consumption during implementation.
Sacramento River Deep Water Ship Channel Project	USACE and Port of Sacramento	Planning	The Sacramento River Deep Water Ship Channel Project would complete the deepening and widening of the navigation channel to its authorized depth of 35 feet.	Potential short-term impacts from increase in energy consumption during implementation.
San Luis Reservoir Low Point Improvement	Reclamation, Santa Clara Valley Water District, and San Luis and Delta-Mendota Water Authority	Planning	The San Luis Reservoir Low Point Project is designed to address water supply reliability issues in San Luis Reservoir that result when water levels fall below 369 feet above sea level (corresponding to a reservoir capacity of 300,000 AF) and create water quality degradation that has the potential to interrupt a portion of the San Felipe Division's water supply.	Potential short-term impacts from temporary increase in energy consumption from implementation. May reduce energy generation or require additional energy during operations.

Program/Project	Agency	Status	Description	Impacts on Energy
San Joaquin River Restoration Program	Reclamation, USFWS, NMFS, DWR, and CDFW	Ongoing	The San Joaquin River Restoration Program is a comprehensive long-term effort to restore flows to the San Joaquin River from Friant Dam to the confluence of Merced River and restore a self-sustaining Chinook salmon fishery in the river while reducing or avoiding adverse water supply impacts from restoration flows.	Potential short-term impacts from temporary increase in energy consumption from implementation. May reduce energy generation or require additional energy during operations.
Delta Fish Species Conservation Hatchery	USFWS, Reclamation, DWR, and CDFW	Planning	Reclamation proposes to partner with DWR to construct and operate a conservation hatchery for delta smelt at Rio Vista by 2030.	Potential short-term impacts from temporary increase in energy consumption from implementation. Would require additional energy during operations.
South Bay Aqueduct Improvement and Enlargement Project	Zone 7 Water Agency and DWR	Planning	The South Bay Aqueduct Improvement and Enlargement Project will improve and expand the existing South Bay Aqueduct. The project will increase the existing capacity of the water conveyance system up to its design capacity of 300 cfs and expand capacity in a portion of the project to add 130 cfs (total of 430 cfs). These improvements are expected to assist Zone 7 in meeting its future conveyance capacity needs and allow DWR to reduce SWP peak power consumption by providing for variation in pumping and delivery schedule.	Potential short-term impacts from temporary increase in energy consumption from implementation. May reduce energy generation or require additional energy.
Sites Reservoir/North of the Delta Offstream Storage	Sites Reservoir Authority	Planning	Located 10 miles west of the town of Maxwell in rural Glenn and Colusa Counties, Sites Reservoir would be an offstream storage facility that captures and stores stormwater flows in the Sacramento River for release in dry and critical years for environmental use and for California communities, farms, and businesses.	Potential short-term impacts from temporary increase in energy consumption from implementation. May reduce energy generation or require additional energy.
Lower Putah Creek Realignment	CDFW	Planning	The project will restore 300–700 acres of tidal freshwater wetlands, creating 5 miles of a new fish channel, improving anadromous fish access to 25 miles of stream, and restoring at least 5,000 square feet of salmon spawning habitat.	Potential short-term impacts from temporary increase in energy consumption from implementation.

Program/Project	Agency	Status	Description	Impacts on Energy
Southport Early Implementation Project	WSAFCA	Planning	The WSAFCA is proposing the Southport Sacramento River EIP to implement flood risk–reduction measures along the Sacramento River South Levee that protects the Southport community.	Potential short-term impacts from temporary increase in energy consumption from implementation.
Hill Slough Restoration Project	CDFW	Planning	The project would restore brackish tidal marsh and associated upland ecotone at the northern Suisun Marsh near the corner of Highway 12 and Grizzly Island Road to benefit endangered as well as migratory and resident species.	Potential short-term impacts from temporary increase in energy consumption from implementation.
Goat Island at Rush Ranch Tidal Marsh Restoration	Solano Land Trust	Planning	This project would restore tidal marsh habitat by reconnecting and reestablishing tidal marsh hydrology and related physical and ecological processes within and around Goat Island Marsh.	Potential short-term impacts from temporary increase in energy consumption from implementation.
Lookout Slough Tidal Habitat Restoration and Flood Improvement Project	DWR	Planning	The project is designed to be a multibenefit project to restore approximately 3,100 acres of tidal marsh, increase flood storage and conveyance in the Yolo Bypass, increase levee resilience, and decrease flood risk.	Potential short-term impacts from temporary increase in energy consumption from implementation.
SR-239 Project (East Bay – Contra Costa, Alameda, northern San Joaquin Counties)	Contra Costa Transportation Authority, Contra Costa County, Caltrans	Planning	The SR-239 project will provide a new, four-lane highway from SR-4 at Marsh Creek Road in Contra Costa County to Interstate 580 in Alameda County.	Potential short-term impacts from temporary increase in energy consumption from implementation.
City of Antioch Brackish Water Desalination Project	City of Antioch	Planning	The Antioch Brackish Water Desalination Project, which utilizes existing infrastructure to the extent possible, includes the construction of new desalination facilities and associated infrastructure to improve the City's water supply reliability and operational flexibility.	Potential short-term impacts from temporary increase in energy consumption from implementation. May require additional energy.

AF = acre-feet; Caltrans = California Department of Transportation; CAP = Climate Action Plan; CDFW = California Department of Fish and Wildlife; cfs = cubic feet per second; CVJV = Central Valley Joint Venture; DPWD = Del Puerto Water District; DWR = California Department of Water Resources; EIP = Early Implementation Project; FERC = Federal Energy Regulatory Commission; GHG = greenhouse gas; MID = Merced Irrigation District; MW = megawatt; NMFS = National Marine Fisheries Service; NPDES = National Pollutant Discharge Elimination System; PG&E = Pacific Gas & Electric Company; Reclamation = U.S. Department of the Interior Bureau of Reclamation; SR = State Route; State Water Board = California State Water Resources Control Board; SWP = State Water Project; TID = Turlock Irrigation District; USACE = U.S. Army Corps of Engineers; USFWS = U.S. Fish and Wildlife Service; WSAFCA = West Sacramento Area Flood Control Agency.

22.3.5.1 Cumulative Impacts of the No Project Alternative

The No Project Alternative in combination with other cumulative projects is not expected to cumulatively affect energy resources or result in wasteful, inefficient, or unnecessary use of energy. Ongoing and reasonably foreseeable future projects may affect regional energy use; however, projects associated with the No Project Alternative (water recycling, desalination, and groundwater extraction) would not create substantial demand that would cumulatively affect net energy resources or energy use for SWP and CVP south-of-Delta pumping. Therefore, this energy impact would not be cumulatively considerable.

22.3.5.2 Cumulative Impacts of the Project Alternatives

All project alternatives would result in increases in the short-term and long-term use of energy relative to existing conditions. Construction activities would consume diesel and gasoline to power heavy-duty vehicles, as well as electricity to power tunnel boring machines and equipment. As stated in Impact ENG-1, construction activities would include implementation of Environmental Commitments EC-7: *Off-Road Heavy-Duty Engines,* EC-8: *On-Road Haul Trucks,* EC-9: *On-site Locomotives,* EC-10: *Marine Vessels,* and EC-13: *DWR Best Management Practices to Reduce GHG Emissions* (Appendix 3B), which include construction BMPs such as minimizing idling times, maintaining all construction equipment in proper working condition, using renewable diesel, and implementing other measures to reduce pollutants. These measures would help to improve equipment efficiency and reduce energy use of the project. Even if project construction were to occur simultaneously with other cumulative projects, the cumulative use of energy resources during construction would be consistent with normal construction practices. Therefore, construction of the project alternatives in combination with cumulative projects would not create a long-term cumulative impact on the supply and/or availability of energy sources during construction. The short-term increase in energy consumption attributed to constructing the project alternatives, combined with implementation of projects listed in Table 22-17, would be less than significant and the project alternatives' contribution to impacts on energy resources would not be cumulatively considerable.

Operation of all project alternatives would result in an increase in annual electricity use for pumping and water conveyance through the Delta; however, operation would not result in significant impacts on energy use. The amount of electricity that would be used each year would depend on hydrological conditions as well as the specific features of the alternative (i.e., pumping capacity and energy factor). As summarized in Table 22-12 each alternative would result an average annual net increase of SWP electricity consumption over existing conditions. As part of project operation, efficiencies would be implemented, as described in Impact ENG-1, reducing the potential for unnecessary, wasteful, or inefficient energy consumption. Electricity would be supplied from existing or new generation facilities to the new pumping plants. All existing and new facilities would be subject to efficiencies required under SB 100. Although projects listed in Table 22-17 are projected to use more energy and would contribute cumulatively to regional energy use, the cumulative increase would not result in a cumulatively considerable wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation, nor would there be cumulatively considerable conflict with or obstruction of state/local plan goals, objectives or policies for renewable energy or energy efficiency.